

## CLAIMS

### We claim:

1. A gas leak detection device for a fuel cell system comprising a main valve in a fuel gas supply source, comprising:

5 a shutdown valve provided in a fuel gas supply channel downstream of said main valve;

a pressure monitoring device that monitors a pressure in said fuel gas supply channel between said main valve and said shutdown valve;

10 a depressurization treatment device that depressurizes the inside of said fuel gas supply channel; and

a determination device that monitors a variation of pressure in a sealed space of said fuel gas supply channel formed between said main valve and said shutdown valve after said main valve and said shutdown valve have been closed and determines an operation state of said main valve based on the variation of pressure  
15 in said sealed space, wherein

in said depressurization treatment, said fuel gas supply channel is depressurized until the pressure enters a pressure range in which the pressure can be monitored in said pressure monitoring device.

20 2. The gas leak detection device according to claim 1, wherein

a plurality of said pressure monitoring devices with different pressure ranges are provided in said fuel gas supply channel; and

one of said pressure monitoring devices is selected to monitor the pressure according to the pressure attained by depressurization of said fuel gas  
25 supply channel.

3. The gas leak detection device according to claim 1, wherein  
a variation of pressure in said sealed space is determined as an  
abnormally of said main valve in the case where the pressure rises to or above a  
predetermined value.

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4. The gas leak detection device according to claim 1, wherein  
a variation of pressure in said sealed space is determined as a gas leak  
from said fuel gas supply channel in the case where the pressure drops to or below  
the predetermined value.

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5. The gas leak detection device according to claim 1, further comprising  
a recovery tank that recovers said fuel gas that flows through said fuel  
gas supply channel; and  
drive means that recovers said fuel gas into said recovery tank during  
said depressurization treatment.

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6. The gas leak detection device according to claim 1, wherein said  
shutdown valve and said main valve are closed during depressurization downstream.

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7. A gas leak detection device, comprising:  
a fuel gas supply source;  
a main valve that shuts down a fuel gas from said fuel gas supply  
source;  
a shutdown valve provided in a fuel gas supply channel downstream of  
said main valve;

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pressure monitoring means that monitors a pressure in said fuel gas supply channel between said main valve and said shutdown valve;

depressurization treatment means that depressurizes the inside of said fuel gas supply channel; and

5 determination means that monitors a variation of pressure in a sealed space of said fuel gas supply channel formed between said main valve and said shutdown valve after said main valve and said shutdown valve have been closed and determines an operation state of said main valve based on the variation of pressure in said sealed space, wherein

10 in said depressurization treatment, said fuel gas supply channel is depressurized to a pressure range in which the pressure can be monitored in said pressure monitoring device.

8. A gas leak detection method for a fuel cell system comprising a main valve in a fuel gas supply source, comprising the steps of:

15 closing said main valve, while conducting a depressurization treatment of the downstream side of a fuel gas supply channel;

closing a shutdown valve provided in said fuel gas supply channel, while conducting the depressurization treatment of the downstream side;

20 monitoring a variation of pressure in a sealed space of said fuel gas supply channel formed between said main valve and said shutdown valve, after said main valve and said shutdown valve have been closed;

and determining an operation state of said main valve based on a variation of pressure in said sealed space, wherein

25 in the step of shutting down said shutdown valve, said shut down valve is shut down when said sealed space is depressurized to a pressure range in which

the pressure can be detected in a pressure sensor for detecting a pressure in said sealed space.

9. The gas leak detection method according to claim 8, wherein

5 when a plurality of pressure sensors with different pressure ranges are provided in said fuel gas supply channel,

in the step of monitoring said variation of pressure, one of said pressure sensors is selected for pressure detection according to the pressure in said sealed space.